Restricting Device

The present invention relates to restricting devices, and in particular to releasable restricting devices that limit the opening and closing of a vent.

Windows often include a vent connected to a frame by a hinge. This arrangement enables the window to be opened widely. However, it is often desirable to be able to restrict the extent to which this type of window can be opened during normal use for reasons of safety and security. Any device for restricting the opening of a window during normal use must also allow the window to be opened fully when required, for example for cleaning or in the case of a fire.

Although a number of restricting devices have been suggested in the prior art, many of such devices are complicated to manufacture and difficult to use. In particular, many of the prior art restricting devices have to be incorporated when a vent is manufactured or hung, and cannot be added to restrict the movement of a vent that is already in place.

The present invention aims to provide a restricting device that is simple and easy to operate. The restricting device provided by the present invention is also detachable and can therefore be added to restrict the movement of vents that have already been hung.

The invention provides a restricting device for a closure including a vent hingedly connected to a frame, the restricting device being adapted to act between the vent and the frame and comprising a plate, an arm and means for releasably interengaging the arm and the plate, wherein, in use, when the plate and the arm are interengaged, the closure can only be opened a predetermined distance, the means for releasably interengaging the arm and the plate comprising a resilient means adapted to engage a locking pin, engagement between the arm and the plate being released by releasing the resilient means, the means for releasing the resilient means being separate from the rest of the device.

The resilient means may be mounted on the arm and adapted to engage a locking pin mounted on the plate. Alternatively, and more preferably, the resilient means is mounted on the plate and adapted to engage a locking pin mounted on the arm.

Preferably, the locking pin comprises a tapered head of increasing diameter leading to a neck portion of reduced diameter. Preferably, engagement between the locking pin and the resilient means occurs by forcing the tapered head of increasing diameter past the resilient means such that the resilient means engages with the neck portion of the locking pin, thereby securing the locking pin and hence the arm in place.

Preferably, the resilient means comprises a resilient strip, preferably a metal strip, having one or two legs. Preferably, the resilient means comprises a resilient strip having two legs such that engagement between the locking pin and the resilient means occurs by forcing the tapered head of increasing diameter between the two legs of the resilient strip so that the resilient strip engages with the neck portion of the locking pin.

Preferably, the restricting device further comprises means for mounting the resilient means on either the plate or the arm. Where the resilient means comprises a resilient strip having two legs, the means for mounting the strip of metal preferably comprises rivets which are adapted to hold the two legs of the strip in an operative position to allow engagement with the locking pin to occur. The means for mounting the resilient strip may further comprise a support plate to hold the resilient strip in place.

Where the resilient means is a resilient strip having two legs, the means for releasing the resilient means is preferably a key that can be used to force the legs of the resilient strip apart such that the locking pin can be released. Where the locking pin comprises a tapered head of increasing diameter leading to a neck portion of reduced diameter, the key can preferably be used to force the legs of the resilient strip apart such that the major diameter of the tapered head of the locking pin can pass between them. Preferably, the key is adapted to be able to pass between the two legs of the resilient strip when it is engaged with the neck portion of the locking pin but to force the two legs of the resilient strip apart when the key is rotated. Preferably, the key has an eccentric cross-section, more preferably the cross-section has a major axis that is substantially perpendicular to a minor axis. Most preferably, the key has a diamond-shaped cross-section.

Preferably, the device further comprises key rotation stop means which prevents rotation of the key beyond a position in which the two legs of the resilient strip are forced apart to a maximum extent. This prevents the key from being over-rotated beyond a position in which the locking pin is releasable from the resilient strip. Even more preferably, the key rotation stop means comprises a specially shaped portion of the key and a correspondingly specially shaped hole in the plate. Preferably, the specially shaped portion of the key is semi-circular in cross-section, and the specially shaped hole in the plate includes a v-shaped notch, whereby the key is able to be turned through 90° between a position in which the specially shaped portion of the key abuts a first edge of the v-shaped notch, and

a position in which the specially shaped portion of the key abuts a second edge of the v-shaped notch.

The plate of the restricting device may be mounted on a vent with the arm of the restricting device being mounted on a frame. Alternatively, and preferably, the plate of the restricting device is mounted on a frame and the arm of the restricting device is mounted on a vent. Preferably, the arm of the restricting device is pivotally mounted on either of one of a frame or a vent. Preferably, the arm of the restricting device is pivotally mounted on a track mounted on one of either a frame or a vent. Preferably, the track is a C-section track. More preferably, the arm is pivotally mounted on a slider, possibly a friction slider, that is mounted in the track and adapted to slide along the track. The track preferably comprises stops to limit the extent to which the slider can slide along the track and to prevent the slider from sliding off either end of the track.

The restricting device of the invention may be adapted for use on any closure including doors and windows. Preferably, the restricting device is adapted for use on a window. The plate of a restricting device of the invention may include screw-holes to facilitate mounting the plate on a frame or a vent of the closure. Where the restricting device comprises a track, the track may also include screw-holes to facilitate attaching the track on a vent or a frame of the closure.

Other preferred features of the restricting device described above will become apparent from the description with reference to the drawings which follows herein.

The present invention is now described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is an exploded isometric assembly drawing of an embodiment of a restricting device according to this present invention; and

Figures 2 to 8 are 2D drawings detailing the engagement and release of a locking pin mounted on an arm by a resilient means mounted on a plate, according to the present invention;

Figure 9 corresponds with Figure 1, but shows an alternative embodiment of the restricting device, in accordance with the present invention;

Figures 10A to 10C are plan views from below, detailing the rotation of a key of the restricting device of Figure 9;

Figure 11 corresponds with both Figures 1 and 9, but shows another alternative embodiment of the restricting device, in accordance with the present invention;

Figure 12A is a side view of part of the restricting device of Figure 11;

Figure 12B is a view on section A-A of Figure 12A; and

Figures 12C to 12E are views on section B-B of Figure 12A, detailing the rotation of a key of the restricting device of Figure 11.

Referring to Figure 1, a restricting device comprises a joggled link (or mounting plate) 1 for attachment to a frame (not shown), a C-section track 10 for attachment to a vent (not shown), a slider 8, a pivot arm 7, a locking pin 5, a spring 2, and a key 6.

The joggled link includes screw-holes 15 to facilitate the attachment of the joggled link to the frame. The spring 2 is located beneath the joggled link 1 and above a support plate 4. The spring comprises a resilient strip of metal having two legs. Rivets 3 hold the joggled link 1, spring 2 and support plate 4 together. The rivets 3 also hold the two legs of the resilient strip of metal in an operative position to enable engagement with a locking pin on the arm to occur.

The track 10 includes screw-holes 13 to facilitate attachment of the track to a vent. A slider 8 is engaged with the track 10 such that it can slide along it. The track 10 also includes crack stops 14 which limit the extent to which the slider 8 can slide along the track 10 and prevent the slider 8 from sliding out of the ends of the track 10.

The pivot arm 7 is pivotally connected to the slider 8 by means of a rivet 3 and a washer 9. The other end of the pivot arm 7 comprises the locking pin 5 having a tapered head 5b of increasing diameter leading to a neck portion 5a of reduced diameter. The joggled link 1 has a pivot hole 11 for receiving the locking pin 5 when the pivot arm 7 is engaged with the joggled link 1 and a keyway 12 for receiving the key 6 to enable the pivot arm 7 to be released from the joggled link 1.

Figures 2 to 5 detail the engagement of the locking pin 5 of the pivot arm 7 with the joggled link 1. Referring to Figure 2, the tapered head of the locking pin 5 is pushed through the pivot hole 11 of the joggled link 1. The tapered head of the locking pin 5 engages on the legs of the spring 2 below the joggled link forcing them apart, as shown in Figure 3. Eventually, as shown in Figure 4, the legs of the spring 2 are forced far enough apart to enable the major diameter of the tapered head of the locking pin 5 to pass between them. Once the major diameter of the locking pin 5 has passed between the legs of the

spring 2, the legs of the spring 2 flex back into the reduced diameter of the neck portion of the locking pin 5, securing it in place, as shown in Figure 5. If the locking pin 5 is engaged with the joggled link in this way when the vent is closed, the vent can only be partially opened. The vent can only be opened as far as is allowed by the sliding of the slider 8 along the track 10 mounted on the vent.

Figures 6 to 8 detail the release of the pivot arm 7 from the spring 2. Release of the pivot arm is achieved by using a key 6 which is inserted into a keyway 12 in the joggled link, as shown in Figure 6. The key 6 has a diamond-shaped cross-section 12a with one diameter of the diamond being sufficiently small to enable the key to pass between the legs of the spring 2 when it is engaged with the neck portion of the locking pin 5. As the key is rotated, the larger second diameter of the diamond cross-section engages with the legs of the spring 2 (Figure 7) eventually flexing them apart enough to enable the major diameter of the tapered head of the locking pin 5 to pass between them, as shown in Figure 8. The locking pin 5 can then be removed from the spring 2 through the pivot hole 11 in the joggled link 1. As the movement of the pivot arm 7 is no longer restricted by engagement with the spring 2 attached to the joggled link 1, the movement of the vent is not restricted and it can open freely. It will be appreciated that the cross-section of the key does not have to be diamond-shaped. A key with any suitable cross-section may be used provided that it is able to pass between the legs of the spring when the spring is engaged with the neck of the locking pin, and that, on rotation, it is able to engage with the legs of the spring, forcing them apart to enable the major diameter of the tapered head of the locking pin to pass between them such that the locking pin can be removed.

In Figure 9, there is illustrated an alternative key 6'. The key 6' has the same diamond-shaped cross-section as key 6. However, at the distal end of the key 6' there is an additional raised portion 16. As best seen in figures 10A to 10C, the additional raised portion 16 has a quadrant-shaped cross-section. In this embodiment, the support plate 4 includes a semi-circular hole 17 in alignment with the keyway 12 in the joggled link 1.

When the key 6' is inserted in the keyway 12, the raised portion 16 is located so that a first radial edge 16a is adjacent the diametrical edge 17a of the hole 17. This prevents the key 6' being turned in a clockwise direction (when viewed from below, as in figures 10A to 10C). Thus the key 6' may only be turned in an anti-clockwise direction. Figure 10B shows the key 6' partially rotated. As shown in figure 10C, once the key 6' has been

rotated through 90°, the second radial edge 16b of the raised portion 16 abuts the edge 17a of the semi-circular hole 17. Thus any further anti-clockwise rotation is prevented.

This position corresponds to that of Figure 8, whereby legs of the spring 2 are flexed apart to a maximum extent by the diamond-shaped cross-section of the key. Thus, the raised portion 16 and the semi-circular hole 17 together comprise key rotation stop means which prevent over-rotation of the key 6' beyond the position of maximum flexion of the legs of the spring 2.

An alternative embodiment is illustrated in Figures 11 to 12E. In this embodiment, the key 6" has a distinct form, and the keyway 12 in the joggled link 1 is provided with a v-notch 18. As best shown in figure 12B, a distal portion 19 of the key 6" has a cross-section that corresponds to the shape of the keyway 12. In other words, the distal portion 19 has a diamond-shaped cross-section with a v-groove 19a. When inserted into the restricting device, the distal portion 19 of the key 6" must be oriented so that the v-groove 19a is in alignment with the v-notch 18. As best shown in figures 12C to 12E, a proximal portion 20 of the key 6" has a semi-circular cross-section. When fully inserted, the distal portion 19 is located adjacent the spring 2, for co-operation therewith, and the proximal portion 20 is located within the keyway 12.

The proximal portion 20 is oriented relative to the distal portion 19 such that when first inserted into the device (Figure 12C), the diametrical edge of the proximal portion is adjacent a first edge 18a of the v-notch 18. This prevents the key 6" being turned in a clockwise direction (when viewed from below, as in Figures 12C to 12E). Much as for the embodiment of Figures 9 to 10C, the key 6" is able to be rotated in an anti-clockwise direction through 90°. At this point (see Figure 12E), the diametrical edge of the proximal portion 20 abuts a second edge 18b of the v-notch, thus preventing any further rotation.

The specially shaped keyway 12 with the v-notch 18, and the key 6" with the proximal 20 and distal 19 portions together comprise a key rotation stop. This functions in substantially the same manner as that described with respect to Figures 9 to 10C.

It will of course be understood that the present invention has been described above purely by way of example, and that modifications of detail can be made within the scope of the invention.